◆ **Thm G2 (Cancellation Theorem)**

$a \cdot c = b \cdot c \Longrightarrow a = b,\ c \neq 0$ and $a + c = b + c \Longrightarrow a = b$

[05-12-04A-T7]

Cancellation

Work the following using only theorems up to G2, axioms, and definitions.

You must show every step. Write the justification, but only for those steps that use theorems.

■ **A. Solve the following for x. Use the Cancellation Theorem wherever you can.**

[1] $x + \frac{5}{13} = \frac{5}{13}$ (hint $\frac{5}{13} = \frac{5}{13} + 0$)

[2] $2 \cdot x = 2$ (hint $2 = 2 \cdot 1$)

[3] $3\,x = 3$

[4] $\frac{1}{13}\,x = \frac{1}{13}$

[5] $x + \sqrt{5} = \sqrt{5}$

[6] $x + 3 = -3$

[7] $3\,x + 5 = 3 + 5$

[8] $\frac{1}{\sqrt{3}}\,x + \sqrt{2} = \sqrt{2} + \frac{1}{\sqrt{3}}$

[9] $12\,x + \frac{\sqrt{11}}{\sqrt{99}} = 2\,x + \frac{\sqrt{11}}{\sqrt{99}} + 7$

[10] Prove the cancellation theorem.

■ A. Answers

[1] $x = 0$

[2] $x = 1$

[3] $x = 1$

[4] $x = 1$

[5] $x = 0$

[6] $x = -6$

[7] $x = 1$

[8] $x = 1$

[9] $x = \frac{7}{10}$